

# Mojtaba Ranjbar (PhD)

Address: Origovägen 6B, SE 412 96 Göteborg, Institutionen för fysik, Sweden

Phone: +46 7287 27877

E-mail: [mojtbaranjbar2008@gmail.com](mailto:mojtbaranjbar2008@gmail.com)

Website: <http://se.linkedin.com/pub/mojtaba-ranjbar-phd/14/58/32b>

## Research Interests

Perpendicular magnetic recording technology, Bit patterned media, Nano fabrication and thin film technology, Spin torque oscillator, Spin Torque Transfer-MRAM, Microwave devices, Magnonics devices.

## Education Qualifications

### **PhD Degree (SINGA scholar)**

- August 2008- August 2012.
- Thesis title: Investigations of Magnetic Nanostructures for Patterned Media.
- Department of Electrical and Computer Engineering, National University of Singapore (NUS) and Data Storage Institute (DSI, A\*STAR).

### **Bachelor Degree**

- ❖ Major: Applied Physics (Optics, laser, electromagnetism and Electrical Engineering).
- Shiraz University, Iran (2003- 2007)
- Project Title: Modeling of Nano Optical Fiber with a Metal Clad.

## Working Experiences

- ❖ Postdoctoral fellowship, working on Microwave, Spin torque oscillator and Magnonics devices, at Physics Department, University of Gothenburg, Sweden, November 2012-present.
- ❖ Staff Scientist I, Non-Volatile memory division (working on STT-MRAM), Data Storage Institute (DSI), Singapore, August 2012-November 2012

## Books

- ❖ M. Ranjbar, “Investigations of Magnetic Nanostructures for Patterned Media”, ISBN: 978-3-659-31050-8, LAP LAMBERT publisher, 2012.

## Awards

1. Best poster award, International Conference on Materials for Advanced Technologies (ICMAT), Singapore (2011).
2. Best poster award (1<sup>st</sup> Prize), 2<sup>nd</sup> Annual poster competition on magnetism, Singapore (2011).
3. Best poster merit award, 1<sup>st</sup> Annual poster competition on magnetism, Singapore (2010).
4. Singapore International Graduate Award for PhD program in NUS.
5. Best honor undergraduate student, Shiraz University, Iran (2006).
6. First rank in Physics Olympiad, South of Iran, Iran (2005).
7. Best honor in the National Physics Olympiad, Iran (2005).

### Scientific activities

1. Vice president of IEEE Magnetics Society, Sweden (March 2014-present)
2. Session chair at IEEE International Magnetics (INTERMAG) conference, Dresden, Germany (2014).
3. Coordinator at Magnonics Conference, Sweden (2013).
4. Session chair at 58<sup>th</sup> Magnetism and Magnetic Materials (MMM) conference, Denver, USA (2013).
5. Reviewer of Journal of Applied Physics, Applied Physics Letters, Nature Materials, IEEE transaction on Magnetics, Nature Scientific Reports, Journal of Nanoscience and Nanotechnology.
6. Participating in Embarking on PhD career workshop, A\*Star, Singapore (2012).
7. Participating in Scientific Presentation Skills workshop, A\*Star, Singapore (2012).
8. Participating in Scientific Writing Skills workshop, A\*Star, Singapore (2012).
9. Participating in Career Management workshop, A\*Star, Singapore (2012).
10. Attended ICMAT 2011 conference as a student helper in Symposium L, Singapore(2011).
11. Attended IEEE Magnetic summer school, Nanjing University, China (2009).
12. IEEE Magnetic Society Committee Member (Singapore chapter) since 2009.
13. Participating in “Nanoimprint Industrial Symposium (In conjunction with ICMAT 2009)”
14. Taking Certificate of Post Graduates Laboratory Safety training, NUS, Singapore (2009).
15. Participating in Educational workshop(Introduction of nanoparticles Dimention analysis Devices), Shiraz University, Iran (2008).
16. Participating in job creating Educational workshop(Export and Import and its coresponding applications), Shiraz University, Iran (2007).
17. Participating in job creating Educational workshop (Commercial plan Complitaion), Shiraz university, Iran (2007).

### PhD modules (Average: 4.42/5)

Semiconductors fundamentals (4.5/5)	Special topics in physics (4.5/5)	Nanometer scale information storage (5/5)
Magnetic recording technology (4/5)	Nanoscale engineering (4/5)	Characterization of materials and devices (3.5/5)
Optical engineering (4.5/5)		

### First-hand experience with the following equipment and techniques

❖ **Characterization techniques:** Alternating gradient magnetometer (AGM), Vibrating sample magnetometer (VSM), Atomic/Magnetic force microscopy (AFM/ MFM), Magneto-optical Kerr effect (MOKE), X-ray diffraction (XRD), Scanning electron microscopy (SEM), Superconducting quantum interference device (SQUID), Spin-Stand system, Anomalous Hall effect measurement (AHE), Vector Network Analyzer (VNA), Microwave set up, Oscilloscope, Spectrum Analyzer, Micro-BLS.

❖ **Patterned structure fabrication methods:** Electron beam lithography (EBL), Nanoimprint lithography (NIL), Photolithography (Mask aligner), Focused ion beam (FIB), Ion milling, Wire bonding, Inductively coupled plasma (ICP), Reactive ion etching (RIE), RIE-O2 plasma.

❖ **Thin film fabrication methods:** Sputtering (DC-RF), Evaporator, Vaccum thermal annealing, Profiler/ Optical microscope.

## Publications

1. M. Ranjbar, R. Sbiaa, R. K. Dumas, J. Åkerman, S. N. Piramanayagam, “Spin reorientation via antiferromagnetic coupling”, *Journal of Applied Physics*, **115**, 17C103 (2014).
2. Y. Wei, S. Jana, R. Brucas, Y. Pogoryelov, M. Ranjbar, R. K. Dumas, P. Warnicke, J. Åkerman, D. A. Arena, O. Karis, P. Svedlindh, “Magnetic coupling in asymmetric FeCoV/Ru/FeNi trilayers”, *Journal of Applied Physics*, **115**, 17D129 (2014).
3. S. N. Piramanayagam, M. Ranjbar, R. Sbiaa, and T.C. Chong, “Magnetic and First-Order Reversal Curve Investigations of Antiferromagnetically Coupled Nanostructures of Co/Pd Multilayers”, *IEEE transaction on Magnetics*, **48**, 3410 (2012).
4. A. Tavakkoli K. G., M. Ranjbar, H. K. Tan, Allen Poh W. C., R. Sbiaa, and T. C. Chong, “Reverse Imprint Lithography for Fabrication of Nanostructures”, *Nanoscience and Nanotechnology Letters*, **4**, 835 (2012).
5. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, T. C. Chong, and I. Okamoto, “Advanced Magnetic Force Microscopy Tips for High Resolution magnetic imaging”, *Nanoscience and Nanotechnology Letters*, **4**, 628 (2012).
6. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, T. C. Chong, “Magnetic properties of antidots in conventional and spin-reoriented antiferromagnetically coupled layers”, *Journal of Applied Physics*, **111**, 07B921 (2012).
7. S. N. Piramanayagam, M. Ranjbar, H. K. Tan, Allen Poh W.C., R. Sbiaa, and T. C. Chong, “Magnetic Properties of Antiferromagnetically Coupled Antidots of Co/Pd Multilayers”, *Journal of Applied Physics*, **111**, 07B916 (2012).
8. S. N. Piramanayagam, and M. Ranjbar, “Influence of magnetic viscosity on the first order reversal curves of antiferromagnetically coupled perpendicular recording media”, *Journal of Applied Physics*, **111**, 07B728 (2012).
9. S. N. Piramanayagam, M. Ranjbar, R. Sbiaa, A. Tavakkoli KG, and T. C. Chong, “Characterization of high-density bit patterned media using ultra-high resolution magnetic force microscopy”, *Journal of Physica status solidi (RRL) - Rapid Research Letters*, **6**, 141(2012), DOI **10.1002/pssr.201105537**.
10. M. Rahmani, D. Y. Lei, V. Giannini, B. Lukiyanchuk, M. Ranjbar, T. Y. F. Liew, M. Hong, and S. A. Maier, “ Subgroup Decomposition of Plasmonic Resonances in Hybrid Oligomers: Modeling the Resonance Lineshape”, *Nano Letters*, dx.doi.org/10.1021/nl3003683, (2012).
11. M. Ranjbar, S. N. Piramanayagam, S. K. Wong, R. Sbiaa, and T. C. Chong, “Anomalous Hall effect measurements on capped bit-patterned media”, *Applied Physics Letters*, **99**, 142503 (2011).  
Highlighted by A-Star: <http://www.research.a-star.edu.sg/research/6489>
12. M. Ranjbar, A. Tavakkoli K.G., S. N. Piramanayagam, K. P. Tan, R. Sbiaa, S. K. Wong, and T. C. Chong, “Magnetostatic interaction effects in switching field distribution of conventional and staggered bit patterned media”, *J. Phys. D: Appl. Phys.* **44**, 265005 (2011).

13. M. Ranjbar, S. N. Piramanayagam, S. K. Wong, R. Sbiaa, W. Song, H. K. Tan, L. Gonzaga, and T. C. Chong, "Origin of anomalously high exchange field in antiferromagnetically coupled magnetic structures: Spin reorientation versus interface anisotropy", *Journal of Applied Physics*, **110**, 093915 (2011).
14. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, K. O. Aung, Z. B. Guo, and T. C. Chong, "Ion Beam Modification of Exchange Coupling to Fabricate Patterned Media", *Journal of Nanoscience and Nanotechnology*, **11**, 2611 (2011).
15. S. N. Piramanayagam, M. Ranjbar, E. L. Tan, R. Sbiaa, and T. C. Chong, "Enhanced Resolution in Magnetic Force Microscopy using Tips with Perpendicular Magnetic Anisotropy", *Journal of Applied Physics*, **109**, 07E326 (2011).  
One of the Highlighted Articles from the Proceedings of the 55th Annual Conference on Magnetism and Magnetic Materials: [http://jap.aip.org/about/55<sup>th</sup> MMM conference](http://jap.aip.org/about/55th MMM conference).
16. S. N. Piramanayagam, H. K. Tan, M. Ranjbar, S. K. Wong, R. Sbiaa, and T. C. Chong, "Magnetic Interaction in Perpendicular Recording Media with Dual Synthetic Nucleation Layers", *Applied Physics Letters*, **98**, 152504 (2011).
17. A. Tavakkoli K.G., S. N. Piramanayagam, M. Ranjbar, R. Sbiaa, and T. C. Chong, "A path to achieve Sub-10 nm half-pitch using electron beam lithography", *Journal of Vacuum science and technology B*, **29**, 011035-1 (2011).  
One of the top 20 most downloaded articles in JVSTB:  
[http://avspublications.org/jvstb/top\\_20\\_most\\_downloaded](http://avspublications.org/jvstb/top_20_most_downloaded)
18. M. Ranjbar, S. N. Piramanayagam, D. Suzi, K.O. Aung, R. Sbiaa, and T. C. Chong, "Antiferromagnetically Coupled Patterned Media: Potential And Challenges", *IEEE transaction on Magnetics*, **46**, 1787 (2010).
19. R. Sbiaa, S. J. Wong, M. Ranjbar, S. N. Piramanayagam, and T. C. Chong, "Domain structure and magnetic reversal in (Co/Pd) multilayers with different aspects", *Journal of Applied physics*, **107**, 103901 (2010).
20. M. H. Farzad, M. Ranjbar, and H. Mazaheri Far, "Nano fiber with a metal clad", *Journal of Computational and Theoretical Nanoscience*, **7**, 1108 (2010).

### Conference Presentations

1. P. Dürrenfeld, E. Iacocca, M. Ranjbar, S. Chung, S. M. Mohseni, J. Åkerman, "Magnetic droplets in spin-valve nanowires", INTERMAG conference, Dresden, Germany (2014).
2. S. A. H. Banuazizi, S. R. Sani, P. Dürrenfeld, S. Chung, S. M. Mohseni, F. Qejvanaj, M. Ranjbar, R. K. Dumas, J. Åkerman, "Investigation of copper electrode thickness effect in nanocontact spin torque oscillator devices", INTERMAG conference, Dresden, Germany (2014).
3. M. Ranjbar, R. Sbiaa, R. K. Dumas, J. Åkerman, S. N. Piramanayagam, "Spin reorientation induced by antiferromagnetic coupling", 58<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Denver, USA (2013).
4. P. Dürrenfeld, S. Mohseni, F. Gerhard, F. Qejvanaj, M. Ranjbar, S. R. Sani, S. Chung, C. Gould, L. Molenkamp, J. Åkerman, "Low-Linewidth Microwave Emission by Spin Transfer Torque in a Single

Layer Half-Heusler Film”, 58<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Denver, USA (2013).

5. Y. Wei, S. Jana, R. Brucas, M. Ranjbar, R. K. Dumas, P. Warnicke, J. Åkerman, D. A. Arena, O. Karis, P. Svedlindh, “Magnetization dynamics in RKKY-coupled metallic trilayers”, 58<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Denver, USA (2013).
6. S.N. Piramanayagam, M. Ranjbar, R. Sbiaa and T.C. Chong, “First-order reversal curve analysis of antiferromagnetically coupled Nanostructures of Co/Pd Multilayers”, INTERMAG conference, Vancouver, Canada (2012).
7. M. Ranjbar, S. N. Piramanayagam, S. K. Wong, R. Sbiaa, and T. C. Chong, “Reduction of Switching Field Distribution in Bit-Patterned Media”, 56<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Arizona, USA (2011).
8. S. N. Piramanayagam, and M. Ranjbar, “Influence of Magnetic Viscosity on the First Order Reversal Curves of antiferromagnetically Coupled Perpendicular Recording Media”, 56<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Arizona, USA (2011).
9. S. N. Piramanayagam, M. Ranjbar, H. K. Tan, Allen Poh W.C, R. Sbiaa, and T. C. Chong, “Magnetic Properties of Antiferromagnetically Coupled Antidots of Co/Pd Multilayers”, 56<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Arizona, USA (2011).
10. M. Ranjbar, S. K. Wong, R. Sbiaa, S. N. Piramanayagam, H. K. Tan, L. Gonzaga, and T. C. Chong, “Investigation of Spin Reorientation in Complex Multilayer Systems using Anomalous Hall Effect”, INTERMAG conference, Taiwan (2011).
11. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, and T. C. Chong, “Advanced Magnetic Force Microscopy Tips for High Resolution magnetic imaging”, International Conference on Materials for Advance Technology (ICMAT), Singapore (2011).  
(This paper has won the best poster Award).
12. A. Tavakkoli K. G., M. Ranjbar, H. K. Tan, Allen Poh W. C., R. Sbiaa, and T. C. Chong, “Reverse Imprint Lithography for Fabrication of Nanostructures”, International Conference on Materials for Advance Technology (ICMAT), Singapore (2011).
13. M. Ranjbar, S. N. Piramanayagam, S. K. Wong, R. Sbiaa, and T. C. Chong, “Control of Switching Field Distribution of Bit Patterned Media”, 2<sup>nd</sup> Annual poster competition on magnetism for students, Singapore (2011). (This paper has won the best poster Award).
14. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, and T. C. Chong, “Overcoming resolution limit of high density bit patterned media”, 2<sup>nd</sup> Annual poster competition on magnetism for students, Singapore (2011).
15. M. Ranjbar, A. Tavakkoli K. G., S. N. Piramanayagam, R. Sbiaa, and T. C. Chong, “Influence of Antiferromagnetic Coupling on the switching field distribution of patterned nanostructures”, Joint MMM-INTERMAG Conference, Washington, D. C., USA (2010).
16. M. Ranjbar, S. N. Piramanayagam, D. Suzi, K. O. Aung, R. Sbiaa, and T. C. Chong, “Antiferromagnetically Coupled Patterned Media: Potential and Challenges”, Joint MMM-INTERMAG Conference, Washington, D. C., USA (2010).

17. S. N. Piramanayagam, E. L. Tan, M. Ranjbar, R. Sbiaa, and T. C. Chong, "Enhanced Resolution in Magnetic Force Microscopy using Tips with Perpendicular Magnetic Anisotropy", 55<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Atlanta, Georgia, USA (2010).
18. M. Ranjbar, A. Tavakkoli K. G., S. N. Piramanayagam, K. P. Tan, R. Sbiaa, S. K. Wong, and T. C. Chong, "Effect of antiferromagnetically coupling configurations on switching field distribution of bit patterned media", 55<sup>th</sup> Annual Conference on Magnetism and Magnetic Materials (MMM), Atlanta, Georgia, USA (2010).
19. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, and T. C. Chong, "First Order Reversal Curves Studies of Perpendicularly Antiferromagnetically coupled ferromagnetic layers", Perpendicular Magnetic Recording Conference (PMRC), Sendai, Japan (2010).
20. M. Ranjbar, S. N. Piramanayagam, R. Sbiaa, K. O. Aung, Z. B. Guo, and T. C. Chong, "Ion Beam Modification of Exchange Coupling to Fabricate Patterned Media", International Conference on Materials for Advance Technology (ICMAT), Singapore (2009).
21. M. Ranjbar, M. H. Farzad, and H. Mazaheri Far, "Nano fiber with a metal clad", Asia Optical Fiber Communication & Optoelectronic Exposition & Conference (AOE-Shanghai), China (2008).

### References:

- ✚ **Dr. S. N. Piramanayagam (Prem): (PhD supervisor)**
  - ❖ Senior Scientist III, Data Storage Institute (DSI), Agency for Science Technology & Research (A\*STAR).
  - ❖ Email Address: [Prem\\_SN@dsi.a-star.edu.sg](mailto:Prem_SN@dsi.a-star.edu.sg)
  - ❖ Web address: <http://web.singnet.com.sg/~preetiprem/>
- ✚ **Dr. Rachid Sbiaa: (PhD supervisor)**
  - ❖ Associated Professor in Physics Department, Sultan Qaboos University, Oman.
  - ❖ Email Address: [rachid@squ.edu.om](mailto:rachid@squ.edu.om)
  - ❖ Web address: <http://imb.academia.edu/RachidSbiaa>
- ✚ **Professor Chong Tow Chong: (PhD supervisor)**
  - ❖ Adjunct Professor in Electrical and Computer Engineering Department, National University of Singapore.
  - ❖ Provost of Singapore University of Technology and Design (SUTD).
  - ❖ Email Address: [towchong@sutd.edu.sg](mailto:towchong@sutd.edu.sg)
  - ❖ Web address: <https://researchers.a-star.edu.sg/userprofile.aspx?userid=6348>
- ✚ **Professor Johan Åkerman: (Postdoctoral advisor)**
  - ❖ Professor at University of Gothenburg and KTH (Sweden).
  - ❖ Email Address: [johan.akerman@physics.gu.se](mailto:johan.akerman@physics.gu.se)
  - ❖ Web address: <http://www.akermanlab.com/>